Date: Fri, 18 Mar 94 04:30:14 PST
From: Ham-Ant Mailing List and Newsgroup <ham-ant@ucsd.edu>
Errors-To: Ham-Ant-Errors@UCSD.Edu
Reply-To: Ham-Ant@UCSD.Edu
Precedence: Bulk
Subject: Ham-Ant Digest V94 #70
To: Ham-Ant

Ham-Ant Digest Fri, 18 Mar 94 Volume 94 : Issue 70

Today's Topics:

Send Replies or notes for publication to: <Ham-Ant@UCSD.Edu>
Send subscription requests to: <Ham-Ant-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Ham-Ant Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/ham-ant".

Date: 17 Mar 1994 16:02:29 GMT
From: ihnp4.ucsd.edu!usc!howland.reston.ans.net!pipex!sunic!ugle.unit.no!
trane.uninett.no!eunet.no!EU.net!Germany.EU.net!netmbx.de!zib-berlin.de!
news.belwue.de!news.uni-ulm.de!rz.@network.
Subject: active antenna HE011
To: ham-ant@ucsd.edu

Hello together,
we plan to buy the above namend antenna from ROHDE & SCHWARZ.
Does anyone know anything abt it ? Any experiences ?
Would be glad to hear from you all (via mail) !
tnx and 73 de Peter dh1iar

Date: Thu, 17 Mar 94 10:59:57 GMT
From: ihnp4.ucsd.edu!agate!doc.ic.ac.uk!lyra.csx.cam.ac.uk!pavo.csi.cam.ac.uk!
pipex!uknet!uos-ee!ee.surrey.ac.uk!M.Willis@network.ucsd.edu
Subject: Best cars for mobile HF/VHF??

To: ham-ant@ucsd.edu

In article <CMIACE.D9C@hpqmoea.sqf.hp.com>, dstock@hpqmoca.sqf.hp.com (David Stockton) writes:
|>
|>   I'm happy with my choice, a Diesel powered Range-Rover derivative
|> called a "Discovery"
|>
|>   Give serious thought to Diesels,   no ignition, no computers
|>
|>
|>   David GM4ZNX
Yes, but at a mere 18,000 pounds not many can afford such a car. Practically, I found the Cavallier reasonable RF quiet. Fiat Uno, too noisy. Diesels are definately better, they have a bigger battery too.

Mike

Date: 16 Mar 1994 21:37:05 -0500
From: ihnp4.ucsd.edu!library.ucla.edu!europa.eng.gtefsd.com!news.ans.net!hp81.prod.aol.net!search01.news.aol.com!not-for-mail@network.ucsd.edu
Subject: GAP Challenger DX-VI
To: ham-ant@ucsd.edu

I have this antenna and it works fine if given the proper nurturing. I have found that the ground system will detune the antenna and change the resonant frequencies if changed. The radials if deployed as the manual states will allow the antenna to resonate on the proper frequencies. When the antenna displays a high SWR I have always tracked my problem to the ground system.

Also, the matching stubs need to adjusted while the antenna is vertical (not an easy feat) for proper tuning of the antenna because I have noted that moving them in realtion to each other and the antenna mast proper will change the SWR.

By the way I tune the antenna at its mounting point with an MFJ antenna analyzer that has a precise frequency readout. The changes I mentioned above were noted to be due to minute changes in the antenna's configuration.

As for the performance, I have heard more stations that I can work due to my somewhat meager RF output (my Collins will only put out appoximately 125 watts or so) and the reports I have received from the stations I have worked are in the 5/6 - 5/9+ range.

Keep trying; I'm sure that you can achieve the same results.

73's

Jerry Timmons, WB2UME
Fairfield, Connecticut

Date: 17 Mar 94 02:17:01 GMT
From: ihnp4.ucsd.edu!swrinde!sgiblab!rtech!ingres!kerry@network.ucsd.edu
Subject: Question about hatch lip mounts
To: ham-ant@ucsd.edu

Any net concensus on how the radiation pattern is distorted if a 5/8 wave
is mounted using a lipmount on the R or L side edges of a trunk?

On one side, there is a pretty good ground, but the other is the fender
and open air.

Related, if a similar mounting strategy is used with a hatch, and the
hatch is mostly glass (except for a few defrost elements) would the
preference be for a roof mount?

Or are most of the effects not really worth worrying about?

Thanks in advance.

Date: 17 Mar 94 17:26:46 GMT
From: news-mail-gateway@ucsd.edu
Subject: Question about hatch lip mounts
To: ham-ant@ucsd.edu

Date: Thu, 17 Mar 1994 03:12:19 GMT
From: ihnp4.ucsd.edu!swrinde!emory!wa4mei!ke4zv!gary@network.ucsd.edu
To: ham-ant@ucsd.edu

References <2m4rsv$mba@bigfoot.wustl.edu>,
<1994Mar16.155633.14996@ke4zv.atl.ga.us>,
<brett_miller.15.000E3859@ccm.hf.intel.com>
Reply-To : gary@ke4zv.atl.ga.us (Gary Coffman)
Subject : Re: Grounding and lightning protection

In article <brett_miller.15.000E3859@ccm.hf.intel.com>
brett_miller@ccm.hf.intel.com (Brett Miller - N7OLQ) writes:
>In article <1994Mar16.155633.14996@ke4zv.atl.ga.us> gary@ke4zv.atl.ga.us (Gary
Coffman) writes:
>
>(snip)
>>   That's the principle on which lightning rods are founded. They generate
>>   streamers so that they are the preferred target of lightning bolts. Since
>>   they are installed with low impedance paths to ground, they are able to
>>   *divert* strike currents from harming other nearby structures. This is
>>   called the "cone of protection". It's diameter is equal to about 1/3
>>   the HAAT of the lightning rod in most installations. (High towers have
>>   other problems, and a "rolling sphere" method of estimating the protective
>>   zone must be used.)
>(snip)
>
>This is what I am having a hard time understanding. I am told that if
>I put things on my roof like antennas and solar panels, that they should be
>grounded with heavy guage wire etc. Sounds to me like I'm just turning all my
>roof ornaments into lightning rods! Wouldn't it be better to leave them
>ungrounded and install a lightening rod on the roof?

No, it's better to ground them according to the National Electrical Code
and install a lightning rod. The grounds are there to protect *you*
in case they get struck *despite* the protection of a lightning rod.
Remember their little downleads are still better paths towards ground
than anything else up there other than the lightning rod, but those little
leads go through your equipment to get to ground. Not good. You want to
furnish lightning with a better path to ground than the one through your
equipment. That's what the separate heavy ground lead is for.

Lightning rods are good streamer producers because they have a sharp
point. Current flow at the air terminal is always easier from a sharp
point rather than from a blunt object. Everything else being equal, the
sharpest point on the roof will be preferentially struck.

Gary
--
Gary Coffman KE4ZV | You make it, | gatech!wa4mei!ke4zv!gary
Destructive Testing Systems | we break it. | uunet!rsiatl!ke4zv!gary
534 Shannon Way | Guaranteed! | emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244 | |

Date: (null)
From: (null)
for me, it wasn't worth the added height (and price) for the higher

gain antenna....I stuck with a 1/2w antenna on the side trunk lip.

(with dual band antennas, of course, the mileage will vary with the band. Some of the shorter dual band antennas are a stated 1/2w on 2m and 5/8w on 440).

Gary T. Lau | Internet: glau@ccmail.com
Lotus Development Corporation | Amateur : N6MMM @ N0ARY.#NOCAL.CA.USA.NA
Electronic Messaging and | "Don't blame me, I told them I used
Mobile Computing Division | Microsoft Mail and I still got the job"

Date: Thu, 17 Mar 1994 06:29:11 GMT
From: ihnp4.ucsd.edu!agate!howland.reston.ans.net!gatech!wa4mei!ke4zv!gary@network.ucsd.edu
To: ham-ant@ucsd.edu

References <1994Mar16.155633.14996@ke4zv.atl.ga.us>, <brett_miller.15.000E3859@ccm.hf.intel.com>, <1994Mar16.162143.1@clstcs>
Reply-To : gary@ke4zv.atl.ga.us (Gary Coffman)
Subject : Re: Grounding and lightning protection

In article <1994Mar16.162143.1@clstcs> armyrman@vms4.sci.csupomona.edu (Alex Myrman) writes:
>
>I too have antennas up on the roof and a couple long wire (dipoles) hanging
>around off the house.
>What should be done when lightning comes? I understand clearly that they
>should NOT be in the radio but where should the lead-in's go?

Do commercial broadcast stations disconnect their antennas when a thunderstorm approaches? No. Do their antennas get struck by lightning? Yes, again and again and again. Do their transmitters sustain damage? Do their transmitter buildings burn down? Are their operators killed? No. No. And no. Why? Proper installation. (Truth be told, all of the above *have* happened at commercial broadcast stations, but in every case the cause can be traced to, you guessed it, improper installation.)

Proper installation isn't cheap or easy. Make the slightest mistake, cut the smallest corner, and you open yourself to catastrophic damage. So what's a ham with limited funds and knowledge to do? Many hams just disconnect their coaxes and drop them behind the radio. Some who are a bit more savvy stick the end of the cable in an old mayonaise jar. Neither trick is satisfactory. If your antenna is struck, there's going to be around a *million* volts on that cable, that much voltage can jump 100 inches in air, and it *will* if it has to in order to

reach ground potential.

The only proper way to deal with lightning is to give it a controlled way to go to ground. It's going to go to ground one way or another, your only hope is to direct it in a way that's safe for you, your equipment, and your home.

>I have a heavy ground run to the radio room for grounding the equipment.
>Should the antennas be connected to this, grounding the center conductor
>and sheild? Should they be grounded and a real lightning rod be installed?
>Or just disconnected from the radio's?

Well just disconnecting from the radio isn't good enough. You've got to give that lightning a *low impedance* way to reach ground. And that low impedance path has got to be able to successfully handle 4,000 amperes of *RF* current. That's what lightning is, nature's own spark transmitter.

Ideally you'll have a ground window installed at your station. (I know you folks are probably tired of seeing me preach about this, but it is the best protection you can have.) That ground window will have *every* wire that enters or leaves your station passing through it via proper lightning suppressors, including power, telephone, coax, *everything*. Note, arrange the cabling so that no downlead parallels an interior station cable run. Otherwise surges will be inductively coupled from the outside cable to the inside cable bypassing the ground window.

The ground window will be connected *directly* to your ground field by a straight low inductance conductor. In no case shall the conductor be less than number 8 solid copper wire, but should really be a wide copper strap, 5 inch copper flashing is good. (The reason wide copper strap is preferred is that it's inductive only at its edges, and because skin effect limits current penetration to only a few thousandths of an inch so you want as much surface area as possible.) Ideally there will be no bends in the ground run, but in no case shall there be any *sharp* bends. That adds inductance.

Note that in *addition* to the ground window, every antenna or support whose construction will allow it should have a separate ground conductor run to the station ground field. This will relieve the downleads, and suppressors, of part of the current load they'll have to carry during a strike.

A single 8 foot ground rod is *not* an effective ground field. Ideally we'd copper plate the Earth to form an effective ground field, but that's impractical. So we make do with driven ground rods. In average soil, a single 8 foot ground rod will have a resistance to Earth of about 230 ohms. That will place a connection to that rod at 920 kV during a 4000 ampere strike. Not good. As currents start to flow into the ground, the soil

becomes temporarily *saturated* with charge. This limits the amount of current that can be quickly dumped into any individual Earth connection. So we need a bunch of Earth connections. How many is a bunch? Well good practice says that the total resistance to Earth should be less than 25 ohms, so that means at least 10 rods are required. How far apart should the rods be to avoid overlapping saturation zones? The rule of thumb is that ground rods should be no closer together than the *sum* of their lengths. That means that any two rods in the ground field need to be at least 16 feet apart.

The rods should be laid out in a star pattern with the rods connected to each other by no less than 1.5 inch bare copper strap buried not less than 18 inches below grade level. Note that these straps can be considered horizontal ground rods themselves and can reduce the number of driven rods needed in the system by about a third. So assume 7 rods, one central and six radial at a 16 foot separation. Make all connections to the central rod. That's your *single point ground*. Tie power company, phone company, and CATV grounds to this point as well as attaching your station ground and separate antenna grounds to this point. Never never never daisy chain grounds. All grounds must be tied to this single point, and only to this single point. (Note, if you have a tower, it can serve as the central rod. With its base planted in concrete, it forms a Ufer ground superior to a single driven rod. Note too that if you have metallic underground plumbing, that should also be tied to your single point ground by a strap connection.)

One more caveat. If your soil is dry sandy soil, or very rocky, you'll need more rods than for the typical case above. It's OK to extend your star out beyond the first ground rod, and in this case *only* it's OK to daisy chain along a radial from one rod to another, but more than two rods along a single radial reach a point of diminishing returns. The buried radials themselves, however, make a dandy groundplane for a vertical antenna and can extend out as far as you like.

I've left out many details in the above system, such as how to deal with bonding dissimilar metals, always making a *mechanical* connection as well as an electrical connection (solder *will* melt during a strike), what constitutes a *proper* lightning suppressor, etc. Entire books have been written on proper station installations. You should read at least one, _The National Electrical Code_. And I'd recommend one more, Roger Block's _The Grounds for Lightning and EMP Protection_.

Ok, that's the *proper* way to protect your station. Now what's the cheap ham way? Install an *outdoor* bulkhead panel near ground level and bring all your antenna coaxes through it with bulkhead feedthru connectors. Drive a rod into the ground at least 100 inches from the house and bolt a bar to it that has female coax chassis fittings attached, both shell and center connected to the bar. When a storm

approaches, unscrew all cables from the bulkhead and screw them to
the ground bar. This will keep dangerous currents and voltages *outside*
your house. But that bar is going to reach 900 kV during a strike.
Make sure there's nothing conductive nearby. Obviously *don't* ground
the house bulkhead panel to this rod.

(Note that this cheap approach has several faults. First you've got
to be home to connect the coaxes to the ground bar. Second there is
such a thing as clear sky lightning. Not all strikes occur during
a well defined storm. Third, any cable that passes parallel to the
grounded coaxes is going to have a large surge inductively coupled
into it. And fourth not all lightning is going to come into your
house via your antennas. It can also come in on the power wiring,
the phone wiring, or the CATV wiring. So this method should be
considered a minimum *expedient* only. It does beat a mayonaise
jar.)

Gary
--

Gary Coffman KE4ZV	You make it,	gatech!wa4mei!ke4zv!gary
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End of Ham-Ant Digest V94 #70
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